REMARKS

In response to the Office Action dated April 2, 2007, Applicant has amended pending claims 1-8 to more clearly define the present invention over the cited prior art. Applicant is also adding new claims 9-11 which include the allowable subject matter of objected claims 5, 6 and 8.

Applicant's response to the Examiner's rejection of the pending claims in light of the cited prior art is set forth below.

I. IN RESPONSE TO CLAIM REJECTIONS UNDER 35 U.S.C. §103(a)

Concerning Claims 1-4 and 7

The Examiner rejects claims 1-4 and 7 as being unpatentable over *Tsuzuki* in view of *Ragetti*. In response to these rejections, claims 1-4 have been amended. The amended claims are not obvious from *Tsuzuki* and are not achievable from the combination of *Tsuzuki* and *Ragetti* in view of the following factors. (Since claim 7 is dependent on the amended claim 4, the subject matter of claim 7 has not been amended.)

First, the object of the present invention is different from that of *Tsuzuki*. The object of the present invention is to provide a method of fabricating a component having an internal tooth such as a multiple disc clutch drum or an internal gear and to a rolling machine for accomplishing the fabrication. In other words, the present invention is about the art of forming the internal teeth on the inner side of the cylindrical material by rolling. In contrast, the object of *Tsuzuki* is to provide the roll threading apparatus for threading a threaded profile on an end blank of a metal drum container. That is, *Tsuzuki* discloses art to fabricate the concave-convex thread on the inside and outside of the end blank of the metal drum container. Thus, the technical field

of *Tsuzuki* and that of the present invention are different. Accordingly, *Tsuzuki* is moot as a cited reference to reject the present invention.

Secondly, the present invention and *Tsuzuki* differ in construction. One of the unique characteristics of the present invention is that, in the present invention, rolling starts by inserting cylindrical material for forming a component having internal teeth into a rotatably driven container in an approximately aligned manner. Since "inserting cylindrical material for forming a component having internal teeth into a rotatably driven container in an approximately aligned manner" is a key component of the present invention, it is described below in detail and such limitation is in all of the claims.

Generally, in the method of manufacturing a large diameter ring, the rolling that enlarges the pitch diameter infinitely as the rolling progresses while two rollers hold both sides of a doughnut shape material is known. To cover the shortcoming of this manufacturing method and to raise the degree of restriction in order to secure high-precision processed configurations without variations, the present invention has incorporated means for restraining the outer circumference with the container which is something like a mold made by cold forging.

The rolling processing proceeds by deforming the material by forcibly changing (pressing) the distance between the container rotational axis and the tool rotational shaft, which actually is the axis of rotation. This limitation is likewise in all of the claims.

The aforementioned container is made rotatable by setting the radial bearings at its outer circumference. Also, the material is just inserted in the container in an aligned manner, and the operation/function known as chucking is omitted. The part described herein, in fact, is another feature of the present invention.

To associate the rotational phasing between a material to be processed and a tool has been common knowledge in gear processing, and this very common knowledge has caused a number of issues. The chucking mechanism which has been the presupposition when discussing the rotational phasing is complex; therefore it is low in stiffness, brings about the chucking distortion, and makes it difficult to control the springback upon release. These major difficulties have prevented the introduction of deformation processing. Also, the device known as chucking inevitably requires a very difficult operation, that is, to precisely conform the rotational phasing between the existing internal teeth and the tool in advance for the material with an existing internal tooth. This operation has been regarded as the impossible task till the numerically controlled synchronous mechanism has been adopted.

The idea of making the container rotatable and driven dramatically simplified the apparatus. When the material is just inserted in an aligned manner without chucking, it will get into the state in the initial phase of the processing where the tool rotates the material to be processed while the container remains still. The pitch diameter enlarges as the processing proceeds, and it reaches the state where the material is adhered to the inner side of the container having high stiffness. To set stretching in other axial directions free, to restrain it, or to control it should be selected according to the item.

Processing is accomplished by driving the tool shaft in the present method. The processing cannot be controlled by rotatably driving the container axis in the present invention. The container may rotate but the material to be processed may slip out and may or may not rotate. The present method is therefore clearly different from any method that works when any one of them is driven. The present method is also different from any method that defines the

container axis to be rotatably driven. These limitations are in the pending claims and distinguish over the cited prior art.

By the same token, any method that discusses chucking or the pre-fabrication of material, which does not happen in the present invention, and any method that gives consideration to the rotational phasing of the container axis and the tool shaft are totally different from the present invention from the onset.

Also, the present method envisions not just the ring shape but also the cup-like shape as the shape of the material. Inevitably, the tool shaft is a cantilever bearing.

The capability of the apparatus developed according to the embodiment of the present invention is 20 tons of loading by pressing. The ball screw NC mechanism generates it through a 1/20 taper wedge (alterable). This taper wedge greatly contributes to hold the inner wall of the container and the tool highly rigidity. Also, the relative distance between the container bearing block and the tool bearing block enabled the micro-monitoring in the linear scale other than the NC axis of the output side.

20 tons of loading on a cantilever bearing in a radial direction is capable of overcoming the problem of intensity but cannot prevent the deflection in bending. As its countermeasure, the present method adopts the mechanism that ensures parallelism between the container axis and the tool shaft by tilting the container axis according to the tilt of the tool shaft using a plurality of control shafts. When this mechanism is in work, the rolling bearing with the angle self-aligning function exerts a powerful effect on the aforementioned container rotational bearing. Note, however, that the angle adjustment between the container axis and the tool shaft is relatively done, so this function can be arranged in either of them.

In comparison to the above, in *Tsuzuki*, the end blank w of the metal drum container is supported by turntable 1. Also, in *Tsuzuki*, the end blank w of the metal drum container is configured to rotate synchronously with the turntable 1, the annual threading roll die 2, and the threading roll 3. Consequently, *Tsuzuki*, does not disclose the preconditions of the present invention that is to "insert cylindrical material for forming a component having internal teeth into a rotatably driven container in an approximately aligned manner." Accordingly, the installation condition of the material to be processed in the present invention is different from that of *Tsuzuki*.

Another difference between the present invention and *Tsuzuki* is the condition at the start of rolling. In the present invention, the rolling tool rotates first at the start of rolling. In contrast, in *Tsuzuki*, the end blank w of the metal drum container is configured to rotate synchronously with the turntable 1, the annular threading roll die 2, and the threading roll 3.

Moreover, the present invention does not disclose the thread processing described in *Tsuzuki*. As mentioned in the SUMMARY OF THE INVENTION and the DESCRIPTION OF THE PREFERRED EMBODIMENTS in the Specification, the present invention is configured to change by force a center distance between the rolling tool rotational shaft and a rotational axis of the container by relatively moving the rolling tool rotational shaft by force, while the external teeth of the rolling tool rotational shaft at rotatably driving are being pressed against an inner face of the cylindrical material, to press and deform the cylindrical material between an outer circumference of the rolling tool and an inner circumference of the container while sequentially changing a distance between the rolling tool rotational shaft and a container rotational axis to successively grow a tooth profile, and to complete rolling in a state where the cylindrical material fills the container as a result of the enlarged outer diameter enlarged by spreading.

In contrast, *Tsuzuki* discloses the art of thread processing to fabricate the concave-convex thread at the inside and outside of the end blank of the metal drum container by synchronously rotating the annular threading roll 2 and the threading roll 3 where the annular threading roll die 2 is arranged at the outside of the end blank of the metal drum container and the threading roll 3 at its inside.

Furthermore, in the present invention, the processed component having internal teeth is discharged from the container when the fabrication is completed. In contrast, *Tsuzuki* requires the following extra work to discharge the processed component. Since the tubular flange y of the end blank w is pressed against the annular threading roll die 2 by the threading roll 3 to be processed into a thread shape, the processed tubular flange y of the end blank w needs to be removed from the annual threading roll die 2 by rotating the tubular flange y of the end blank w in reverse direction of its rotation direction, as shown in Fig. 3. The foregoing step is not required in the present invention.

Accordingly, the present invention differs from *Tsuzuki* in its objective and construction. Therefore, the amended claims overcome the reasons for rejection under 35 USC 103(a).

Also, the present invention is not achievable from the combination of *Tsuzuki* and *Ragetti* because *Tsuzuki* itself is different from the present invention. The *Ragetti* reference is only cited to show use of bearings for rotation. As stated above, since both the purpose and the overall construction of the *Tsuzuki* reference differs from the purpose and construction of the present invention, adding the bearings of *Ragetti* does not overcome the distinguishable differences between such combination and the present invention as explained above. Even if the bearing arrangement of *Ragetti* is combined with the disclosure of *Tsuzuki*, which Applicant does not believe to be possible and still achieve the objectives of the *Tsuzuki* invention, this combination

still does not produce and yield the features and limitations of the present invention as disclosed and claimed in the presently pending claims. The purpose, construction, and operation of the present method and apparatus is clearly and distinguishably different from the purpose, method and construction of the roll threading apparatus disclosed in both the *Tsuzuki* and *Ragetti* references, either alone or in combination.

II. IN RESPONSE TO ALLOWABLE SUBJECT MATTER

Concerning Claims 5, 6 and 8 and New Claims 9-11

The original claims 5, 6 and 8 are objected to as being dependent upon a rejected base claim. In response to these rejections, claims 5, 6 and 8 have been rewritten in independent form including all of the limitations of the original base claim 4, and are added to the application as new claims 9-11 by the current amendment. At the same time, amendments have been made to original claims 5, 6 and 8 in line with the amendments made to claim 4. Thus, the objection should be resolved.

It is now believed that all of the pending claims in the present application, namely, claims 1-8 and new claims 9-11 contain limitations and restrictions which patentably distinguish them over the cited prior art. None of the cited references, either alone or in any combination thereof, disclose or suggest all of the novel features associated with the present invention, nor do the prior art constructions provide the specific advantages and objectives obtained by the present invention. Favorable action and allowance of the claims is therefore respectfully requested.

Applicant's request for extension of time under 37 CFR 1.136(a) as well as Applicant's petition fee are enclosed herewith and filed simultaneously with this response.

If any issue regarding the allowability of any of the pending claims in the present application could be readily resolved, or if other action could be taken to further advance this application such as an Examiner's amendment, or if the Examiner should have any questions regarding the present amendment, it is respectfully requested that the Examiner please telephone Applicant's undersigned attorney in this regard.

Respectfully submitted,

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